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CCTV surveillance systems for use in security applications —

Part 2: Operational requirements

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Foreword

This Kenya Standard was developed by the Technical Committee on Extra-low Voltage Equipment and is in accordance with the procedures of the Bureau.

In the preparation of this Kenya Standard, reference was made to SANS 10222-5-1-1:2007, Electrical security installations Part 5-1-1: CCTV installations - CCTV surveillance systems for use in security applications - Operational requirements.

Acknowledgement is hereby made for assistance derived from this source.

The purpose of this part of Kenya Standard is to provide guidance to those responsible for establishing operational requirements that can be used in the preparation of specifications for, and the selecting, installing, commissioning, operating, evaluating and maintaining of CCTV surveillance systems.

The operational requirement development process encourages clear thinking about the *what*, *where*, *when, why* and *by whom* with relation to a CCTV surveillance system. The final design specification should clearly state what the end user expects from the system. Without an operational requirements document and associated test procedures there will be no guarantee that the system will fulfill its intended purpose.

CCTV surveillance systems for use in security applications — Part 2: Operational requirements

1 Scope

This Kenya Standard provides a method for analysing and documenting the needs of the end users of CCTV surveillance systems.

The objectives of this part of Kenya Standard are:

a) To provide a statement of needs based on a thorough and systematic assessment of the problems to be solved and the resultant desired solutions;
b) To provide guidance on writing information checklists
c) To illustrate how these checklists can be applied to the acquisition, installation and management of a CCTV surveillance system.

2 Definitions and abbreviations

For the purpose of this part of Kenya Standard, the following definitions and abbreviations apply

2.1 Definitions

2.1.1

CCTV camera

A unit that contains an imaging device that produces a video signal from an optical image

2.1.2

CCTV surveillance system

A system that consists of one or more CCTV cameras, monitoring and associated equipment for transmission and controlling purposes, which might be necessary for the surveillance of a defined security zone

2.1.3

Operational requirements document

A statement of needs based on a thorough and systematic assessment of the problems to be solved and the required solution

2.2 Abbreviations

2.2.1 CCTV: Closed-circuit television

3 Attributes of the operational requirements document

The operational requirements document should have attributes which enable it to:

a) Be applicable to any size or type of system at any time of its life, from initial concept to review,
b) Provide a framework for discussion and collation of the views of all the stakeholders,
c) Identify the role that CCTV will play in the overall security strategy,
d) Identify relevant and realistic performance goals,

e) Define key factors to be included in a test specification and act as a reference point for the analysis of test results,
f) Expose conflicts of opinion, especially in multi-agency schemes,
g) Allow priorities to be set for the acquisition, implementation and operation of the CCTV surveillance system,
h) Identify future needs for system expansion at the outset,
i) Provide a basis for planning, phased implementation and investment appraisal,
j) Separate operational decision-making from technical decision-making,
k) Reassure, through commissioning tests and routine audits, that performance is linked to current or anticipated needs, and
l) Provide an audit trail for decision-making.

4 Producing the operational requirements document

4.1 The first step in the development of the operational requirements is documenting

a) The problems being faced,
b) The areas in which activities that cause problems can occur, and
c) The desired, ideal and likely responses to these activities.

The analysis involves each of the role players working with checklists and site plans. The checklists provide a framework for assembling in common format information as set out in 4.1.1 to 4.1.5.

4.1.1 Area to be observed

This includes information on the area to be covered and the purpose of the coverage.

4.1.2 Response to the activity

This includes the desired response to an activity and the conditions under which the CCTV surveillance system is expected to operate.

4.1.3 Observer interface

This includes information on where the observation is to take place and who will make it, what quality of picture and magnification is needed for success, and how the observer is expected to perform in response to the activity.

4.1.4 Risk analysis

This includes a list of the risks, benefits and priorities and the requirements for success.

4.1.5 Collation of evidence

This covers all aspects of the recording of evidence that need to be addressed, such as equipment performance, multiplexing, alarm activation, reviewing and the handling thereof after an activity has occurred.

4.2 Information on an operational requirement will need to be drawn from several sources. The completion of checklists enables each stakeholder to analyse and document his own needs in a uniform way and is especially valuable where several different groups are entering into a partnership to address the particular problem for the first time.

4.3 Where a partnership is to be part of the process of addressing the problem, it is important to establish a common vocabulary at the outset. A common vocabulary contributes to an early understanding of the views of others and strengthens the sense of ownership and partnership.

4.4 The accuracy of the analysis of the operational requirements depends on asking the right questions to the right people. Therefore, depending on the application, typical stakeholders in a system will include the following interest groups or persons:

a) Managers (project and any others who are interested);
b) Financial controllers;
c) Security advisors;
d) Police and other security services (to advise on the criminal viewpoint and the appropriate response to an activity);
e) Employees;
f) General public;
g) Neighbours (residential or business);
h) Operators;
i) Technical advisors on procurement, installation and maintenance.

Having established the initial need and identified persons who should be involved, the next step will be to complete an operational requirements document.

5 Methodology for completing the operational requirements document

5.1 It is recommended that the methodology given in 5.2 to 5.10 be used in conjunction with the information checklist given in annex A to assist in the preparation of an operational requirements document.

The checklist is developed specifically with a view to designing public domain CCTV surveillance systems. However, the majority of the questions and responses are applicable to most other situations and the remaining ones can be adapted to meet specific applications. The checklist contains twenty defined questions in tabulated format to ensure that all pertinent information is obtained in respect of a specific area. This type of information is essential to an effective operational requirements document.

5.2 Obtain a site plan and a supply of blank information checklists.

5.3 On a separate sheet, list the issues of concern in the identified area and give each issue an initial priority ranking of "essential" or "desirable".

5.4 Clearly define, on the site plan, each area where the activities that cause problems can occur. Note any important dimensions that define the area to be covered.

5.5 For complex systems the first pass may be at a high level, stating only the broad outlines of the problem. A more detailed analysis is produced by subsequent subdivision. This detailed analysis might include identifying known problem areas, zones related to areas that have alarms, high-risk areas, likely points of entry and potential weak spots.

5.6 Use a separate information checklist for each defined area. Information can be entered in any order. Boxes left blank owing to insufficient information will identify areas that require further investigation.

5.7 Give the purpose of observation of each area (box 3 of the checklist; see annex A) as one or more of the purposes shown in figure 1. A more detailed image is obtained by having each CCTV camera cover a smaller area. Since higher performance is thus more expensive and difficult to achieve, it should be specified only when necessary.

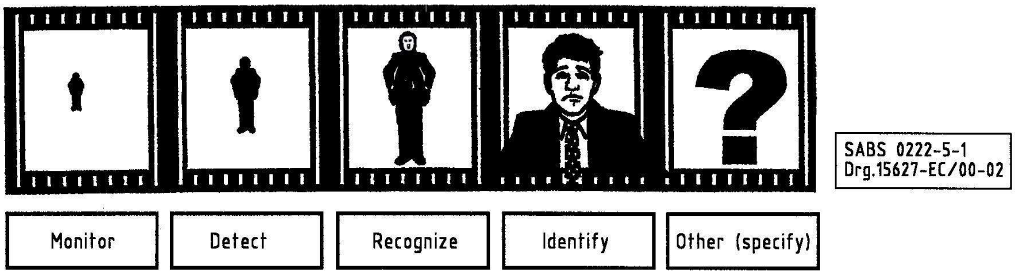

Figure 1 — Examples of image size relevant to image detail

5.8 If any area is to be observed for more than one purpose, a separate checklist should be completed for each purpose.

5.9 Each stakeholder should initially compile their own set of checklists. When these are combined they provide a comprehensive view, which enables potential conflicts to be resolved and priorities to be agreed on, based on factors such as threat and risk assessments. Special needs can be kept confidential, if necessary.

5.10 After prioritization, rationalization, feasibility studies and budgetary studies, a structured analysis of the problems and anticipated solutions can be produced.

6 Guidelines to completing the information checklist

6.1 General

This section provides guidance on completing the checklist with a view to providing pertinent information when compiling the operational requirements document. The heading for each box and examples of typical information responses are given.

6.2 Area reference and type

Shade in, on the site plan, each area where a target will need to be observed and draw up a checklist that has a unique area reference code that corresponds to and identifies each area. Give the type of area at the top of the checklist (see annex A).

6.3 Boxes 1 to 5 — Problem definition

6.3.1 Box 1 — Target to be observed

a) Persons.
b) Groups of individuals.
c) Objects (items of equipment, etc.)
d) Individual vehicles.
e) Traffic.
f) Police or emergency services.
g) Other, not specified above.

If appropriate, define the target as stationary or moving. (Note the speed, in kilometers per hour, if applicable.)

6.3.2 Box 2 — what activity of the target is of concern?

a) Damage to property, litter or graffiti.
b) Robbery, burglary.
c) Changing hands of drugs, money or weapons.
d) Drug abuse.
e) Fighting, assault.

f) Handling stolen property.
g) Loitering or pick-pocketing.
h) Bogus collectors, bogus officials.
i) Traffic offences, accidents.
j) Car crime (theft or damage).
k) Suspicious actions (define).
l) Anti-social behaviour (drinking, vandalism).
m) Other (specify).

6.3.3 Box 3 — Purpose of the observation

a) Monitor
b) Detect
c) Recognize
d) Identify

The targets and activities are identified in boxes 1 and 2 above.

This box suggests four purposes of observation (categories of observer tasks). The following definitions and minimum performance guidelines are applicable (see figure 1):

a) **Monitor:** The observer can determine the number, direction and speed of movement of people whose presence is known to him. In other words, it is not necessary to search for them.
b) **Detect:** Following the alert, the observer can, after a search, ascertain with a high degree of certainty whether or not a person is visible in the pictures displayed to him.
c) **Recognize:** The observer can say with a high degree of certainty whether or not the individual shown is the same person as someone he has seen before.
d) **Identify:** The picture quality and detail should be sufficient to enable the identity of a subject to be established beyond reasonable doubt.

6.3.4 Box 4 — Picture quality and content factors needed to achieve success

a) Clear view of suspect's body language to identify potential problems.
b) Ability to follow the progress of a target.
c) True colour.
d) Real time.
e) Clarification of actions (for example, is the suspect using a key or an implement?)
f) Automatic display of the area covered by the alarm.
g) Overall view of the scene.

6.3.5 Box 5 — Spare

This box can be used according to specific needs, for example:
a) Threat assessment.
b) Rating by assessment panel.
c) Ability of the supplier to comply with the requirements, given as a percentage.

6.4 Boxes 6 to 10 — Operational response

6.4.1 Box 6 — Required result of a successful response to the activity

a) Calmness restored.
b) Dispersal or control of the situation.
c) Prevent or minimize injury and damage.
d) Reduce crime or disorder (or both).
e) Improve safety and reassure the public.
f) Identify suspects and exclude innocent parties.
g) Gather intelligence to assist in the subsequent apprehension of offenders.
h) Apprehend suspect with evidence.

i) Response has been of an appropriate level.
j) Public safety through effective evacuation.
k) Restore traffic flow.
l) Secure the area.

6.4.2 Box 7 — who makes the response?

a) Uniformed police patrol.
b) Traffic police.
c) Armed or specialist response team.
d) Plain-clothes personnel.
e) Traffic officer.
f) Observer.
g) Private security staff employed by the owner.
h) Store detectives.
i) Key holder (owner of the premises or the vehicle).

6.4.3 Box 8 — Time scale of the response for it to be successful

a) As soon as possible.
b) Within minutes.
c) Within hours.
d) Within days.
e) Once a video result has been obtained.
f) In accordance with graded response.

6.4.4 Box 9 — When is observation needed?

a) Until arrest or curtailment.
b) During the activity, as initiated by the sounding of the alarm.
c) 24 hour, continuous basis.
d) Between particular times (for example, rush hour, licensing hours).
e) Specific days or periods (for example, on Mondays, Wednesdays, Saturdays; during school holidays).
f) During or outside trading hours.
g) During pre-organized events based on advance information or special intelligence.
h) When a few or when many people are about.
i) When requested by the police controller.
j) When police are responding to incidents.
k) During the day or at night.

6.4.5 Box 10 — Conditions under which the system needs to be effective

a) State normal or special weather conditions (for example, rain or fog).
b) All likely conditions during the applicable times.
c) Fire or flood.
d) With up to 1, 2, 3, etc. simultaneous activities of the same priority.
e) Changing light levels (for example, nightclub doors opening and closing).
f) Using existing lighting only.
g) Lighting may be enhanced (designer to specify).

6.5 Boxes 11 to 15 — Observer role

6.5.1 Box 11 — what will the observer do when the activity occurs?

a) Switch on a video recorder.
b) Follow the action (obtain close-ups).
c) Identify the location of the object or activity.
d) Notify the response team by radio or telephone.

e) Investigate personally.
f) Give instructions to resources.
g) Describe the incident to the controller.
h) Alert the police and direct pictures to police monitors.
i) Search for the target.
j) Follow set operational procedures.

6.5.2 Box 12 — How will the observer know when and where to look (be cued or prompted)?

a) Direct request by the police controller.
b) Telephone or alarm system.

6.5.2.1 By strategy

a) Rely on past experience, training, culture.
b) Briefing of specific or daily events.
c) Monitoring, for example, a radio channel or telephone calls.
d) Analysing local crime figures.

6.5.2.2 By chance

a) Constant monitoring.
b) Automatic sequencing of pictures.
c) Random picture monitoring.

6.5.3 Box 13 — How quickly does the observer need to act, search for and detect the target?

a) Immediately.
b) Within minutes.
c) Within hours.
d) Within days.
e) Depends on each individual case or in accordance with action plan already drafted.

6.5.4 Box 14 — who makes the observation on which the response is based?

a) Police controller.
b) Car park attendant.
c) Traffic officer.
d) Private security company
e) Store detective.
f) Civilian (for example, employee).
g) Investigator.
h) Casual staff.

6.5.5 Box 15 — where will the observations take place?

a) Police control room.
b) Control room.
c) Private security premises.
d) Police video facility.
e) Police incident control.
f) From a mobile or remote location.
g) Replay or review facility separate from control room.

NOTE: Use a "P" to indicate a primary observation point and an "S" to indicate a secondary observation point.

6.6 Boxes 16 to 20 — Miscellaneous

6.6.1 Box 16 — Stakeholders

These are the views of ... (enter names or organization).

Additional opinions might also be sought from ... (enter names or organization).
a) Local authority.
b) Community groups, the public.
c) Police.
d) Owners of the property.
e) Other emergency services.
f) Occupants.
g) Insurers.
h) Retailers.
i) Car park owners and users.
j) Tourism Board.

6.6.2 Box 17 — what priority is assigned to this task?

a) Essential: Use sub classification high, medium or low, or rate on a scale of 1 to 5, for example E3.
b) Desirable:Use sub classification high, medium or low, or rate on a scale of 1 to 5, for example D2.
c) Threat-dependent.

6.6.3 Box 18 — Likelihood of an activity occurring and how often

Likelihood	**Frequency**
Very	High Continuous
High	Hourly
Medium	Daily
Low	Monthly
Monthly	

6.6.4 Box 19 — how effectively does the task have to be done?

a) Right first time, every time.
b) Initially effectively but less effectively as time passes.
c) Standard high enough to meet the needs of the investigation.
d) Effectively, once or twice, is sufficient.
e) Detect ... % of incidents.

6.6.5 Box 20 — Benefits of doing the action versus not doing it at all

a) Safer prosecutions (less written evidence and better documentary evidence).
b) Enhanced police credibility.
c) Reduced crime.
d) Enhanced public safety.
e) Reduced investigation time.
f) Increased public confidence, higher trade level and reduced fear of crime.
g) Improved policing.
h) Reduced insurance premiums.
i) Complaints dealt with effectively.

6.7 Performance guidelines

6.7.1 General

Performance guidelines are related to the image height of a standing man (defined as 1.6 m). When the image of the man fills the screen vertically the image height is said to be 100 %. The figures are based on a 625 line CCIR standard system and assume that all equipment is correctly adjusted and operated within the design range (see figure 1).

6.7.2 Monitor

The image occupies at least 5 % but less than 10 % of the monitor screen height.

6.7.3 Detect

The image occupies at least 10 % but less than 50 % of the monitor screen height.
NOTE: In respect of 6.7.2 and 6.7.3 it is assumed that the image contrast of the target is sufficiently above the threshold of human sensitivity and that the picture is not unduly cluttered with non-targets.

6.7.4 Recognize

The image occupies at least 50 % but less than 120 % of the monitor screen height.

6.7.5 Identity

The image would occupy at least 120 % of the monitor screen height.

6.7.6 Reading a car license plate

A saloon car image should not occupy less than 50 % of the monitor screen height if the license plate is to be read.
NOTE: In respect of 6.7.4, 6.7.5 and 6.7.6 it is assumed that the angles of view and lighting are suitable and that no significant degrading effects, such as image blur owing to motion or poor focus, is evident.

6.8 Completed checklist

When completed accurately by each stakeholder, the information checklist will
a) Help to ensure that the extent of the problem, perceived or otherwise, is really understood,
b) Allow technically skilled persons to determine whether or not the system can be built and operated effectively and economically,
c) Provide a basis for dialogue and partnership between the many, often disparate, parties involved in security,
d) Act as a planning document (help prioritize needs and establish performance criteria),
e) Help determine the needs of those who will use the pictures to fulfil their role as the interface between the activities that cause problems and the response teams or investigators,
f) Make it easier to assess and compare the various views expressed, and
g) Give a complete view that allows the full costs of ownership to be established and the expected benefits to be defined.
A design specification can be formulated by making use of the data from all the completed information checklists.

7 Design review

7.1 General

While many of the technical issues are capable of definition, providing high quality pictures will be of no value if they are of the wrong scene or if they are not seen by the observer. Many people who purchase CCTV surveillance systems fall into the trap of believing they are buying a simple alarm system when they are actually buying a sophisticated command-and-control system. Whatever the original perception, careful analysis will reveal a mixture of security, safety and management needs.
When designing the system it is important to recognize all the relevant issues.

7.2 Illumination

Adequate lighting has to exist in the area to be observed otherwise pictures will be of a poor quality. If the identification of persons is a requirement, the provision of adequate lighting might not be achieved cost-effectively. Testing is done by measuring the available light using a lux meter during the period when observation is required. If the lighting is inadequate for the purpose of observation, appropriate stakeholders need to be included and additional finances set aside for upgrading the lighting.

7.3 Areas or targets or activities to be observed

This information is obtained from the information sheets submitted by all the role players.

7.4 Responses to the activities

It is important to understand that system design will include facilitating some response. The precise response can be ascertained from the information checklist.

7.5 CCTV equipment selection

Determine the type of cameras, lenses, enclosures, brackets, the transmission medium, recording and methods, etc. to be used.

7.6 Control point considerations

The layout of the control room, the configuration of the operator equipment, the environmental conditions, and the selection and training of operators are important issues to be considered.

A specification can be produced by analyzing and quantifying the information checklists of all the stakeholders.

8 Determining the design and specification

8.1 The information checklists will define a wide range of key specification points, such as the scope and level of effectiveness required, factors related to image quality and contents based on performance.

8.2 Nearly every element of the checklist can be measured in some way, which ensures not only that it can be specified, but also that it can be tested at the commissioning stage. The design has to take into account a wide range of factors, such as the need for communication between the scene to be viewed and the observation point, mechanisms for ensuring that the operator is effectively cued when incidents occur, artificial lighting considerations, etc. In some cases there might be technical constraints, such as existing communication systems.

8.3 Although the checklist might include many explicit requirements, the methodology allows the development of technical specifications to be identified as a separate task. The system designer can be given full responsibility for defining both the mechanisms to be used to meet the requirements and for the choice of equipment.

8.4 A design specification can be either:
a) Exclusively needs-based (the operational requirements based tender), which will require the firm that tenders to provide all the technical information. This is the desired format since the end user then only has to stipulate his needs. The what, where, why and how are stipulated by the firm, or
b) Partially needs-based or technically based, which requires minimum input from the tendering firm, or
c) Technically based, which requires only a cost-based response from the tendering firm

9 Tender based on operational requirements

9.1 By inviting tenders on the basis of the operational requirements contained in the design specification, it is clearly indicated to industry that bids for the project will be judged on the basis of performance, functionality and costs. It enables bidders to be clear about the needs and requirements of the customer and to know that their proposals will be compared on a like-for-like basis. This leveling of the playing field is a frequently stated prerequisite by suppliers if they are expected to put significant effort into their proposals. A lack of clarity at this stage leads to

a) Vague statements by suppliers and customers, and
b) Under pricing to get the business, followed by inevitable dissatisfaction owing to corners being cut, cost overruns or performance shortfalls.

9.2 Bids can be compared using a compliancy matrix against the requirements of each design specification. Both performance and price can be assessed in this way. In drawing up contracts, careful attention to detail will be needed if unsuitable bidders are to be excluded or their bids declared non-compliant. Often the compliancy matrix will reveal bidders who declare their compliance but are in fact unable to comply.

9.3 A contract should be strengthened by the inclusion of appropriate standards and codes of practice.

10 Functional and performance test requirements

10.1 The information checklist leads direct to functionality and performance test requirements that can be included in the design specification, thereby providing a straightforward means of applying a range of pass or fail criteria. If the installed system passes, it is put into service. If it fails, a number of routes are open. It might be that significant changes have occurred that are beyond the control of the security contractor and have a material effect on the operational requirements. For instance, building lines might have changed causing blind spots. Whatever the reason for failure, a review of the operational requirements will help determine the seriousness of the performance shortfall and the impact on security.

10.2 A revised design specification can form the basis of a remedial contract if that is the chosen solution. If the cause of failure is within the contractor's control, remedial action can be requested against a clearly stated performance improvement. Alternatively, the design specification could be reviewed to see if any local or general easement is possible without sacrificing the operational objectives.

11 Management of the CCTV surveillance system

It is essential that once the CCTV surveillance system has been put into service it is managed effectively to ensure that it continues to meet the original operational requirements and is suitably adapted to meet any changing needs when required. Part of this management process will be to make sure that every aspect of the system is maintained at high operating standards to ensure that the system is optimally used.

Annex A

Information Checklist

CCTV operational requirements

Problem definition	Operational response	Observer role	Miscellaneous
1.Target to be observed:	6. Required result of a successful response to the activity:	11. What will the observer do when the activity occurs?	16. Stakeholders
2. What activity of the target is of concern?	7. Who makes the response?	12. How will the observer	17. What priority is assigned to this task
3. Purpose of the observation:	8. Timescale of the response for it to be successful.	13. How quickly does the observer need to act, search for and detect the target	18. Likelihood of an activity occurring and how often
4. Picture quality and content factors needed to achieve success:	9. When is observation needed?	14.Who makes the observation on which the response is based	19. How effectively does the task have to be done
5. Spare	10. Conditions under which the system needs to be effective:	15. Where will the observations take place?	20. Benefits of doing the action versus not doing at all